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Applying methodological search filters to CAB Abstracts to identify research for evidence-based veterinary medicine

By Sarah Anne Murphy, M.L.S.
murphy.465@osu.edu
Head, Veterinary Medicine Library

The Ohio State University
229 Sisson Hall
1900 Coffey Road
Columbus, Ohio 43210

Objective: The study sought to determine whether methodological search strategies identified by Haynes et al. as most effective for locating information for evidence-based medicine in MEDLINE would be effective in locating information in CAB Abstracts for evidence-based veterinary medicine.

Methods: Articles published in the year 2000 volumes of the *Journal of the American Veterinary Medical Association* and *Veterinary Record* were manually examined and classified by format (original study, review, general article, conference report, decision analysis, case report) and purpose category (etiology, prognosis, diagnosis, and treatment or prevention). Search strategies identified by Haynes et al. were then modified and run on the CAB Abstracts database. Sensitivity and specificity were determined by comparing results to the manual review of the literature.

Results: The author manually reviewed 390 articles, 289 articles of which were identified as original studies. Overall, the sensitivity and specificity of the search strategies were disappointing.

Discussion: The methodological search strategies developed by Haynes et al. for MEDLINE were not effective in locating literature for evidence-based veterinary practice in CAB Abstracts. A study examining methodological search strategies for identifying research for evidence-based veterinary practice in the CAB Abstracts database is necessary.

The concept of evidence-based medicine (EBM) involves ''the integration of best research evidence with clinical expertise and patient values'' [1]. Its practice is growing in human medicine, aided by tools such as MEDLINE, ACP Journal Club, and the Cochrane Collaboration. These tools assist clinicians in identifying and critically appraising evidence for application to the clinical setting. Research on the application of evidence-based medicine to veterinary medicine is sparse [2–4]. Challenges for the veterinary clinician include a serious lack of high-quality, patient-centered, veterinary research [5]. The double-blinded, randomized controlled clinical trial, the highest standard of evidence, has historically been avoided in veterinary research for financial, administrative, and ethical constraints. Other trial designs, such as non-randomized or non-controlled clinical trials are favored and more common. While evidence from such trials should not be dismissed, clinicians should be cognizant of the weaknesses inherent in these trial designs and consider these weaknesses when evaluating trial results [6].

Are tools available, however, for veterinary clinicians

interested in identifying research for evidence-based practice? MEDLINE is recognized as a primary tool for identifying literature for evidence-based practice in human medicine. PubMed's Clinical Query feature provides access to high-quality, clinically applicable literature indexed in the database [7]. Based on the research of Haynes et al., the system uses an algorithm of methodological search terms and phrases to identify studies by research design for evidence-based medicine [8]. MEDLINE, however, indexes a small subset of major titles in the veterinary literature. Could similar techniques be applied to the CAB Abstracts database, which indexes the largest number of veterinary journals in the world? This study utilizes the search terms and strategies identified by Haynes et al. as most effective in detecting clinically sound studies and modifies these strategies for the CAB Abstracts database. The sensitivities and specificities of the modified search strategies are then examined by comparing search results to a manual review of veterinary journals. The goal is to provide veterinary clinicians with a mechanism for locating the gold standard veterinary literature required to apply EBM techniques to veterinary practice.

METHODS

Articles in the year 2000 issues of the *Journal of the American Veterinary Medical Association (JAVMA)* and *Veterinary Record* were manually examined by the author and classified for format, purpose, and methodologic rigor using criteria outlined by Haynes et al. [9]. The journals were selected for their general coverage of both small and large animals and their identification in previous studies as commonly perused by practicing veterinarians in Great Britain and the United States [10, 11]. As in the Haynes et al. study, letters to the editor, book reviews, announcements, editorials, news, obituaries, classified advertisements, and continuing education were not classified or included in the study. The author also chose not to examine articles in the ''Veterinary Medicine Today'' and ''Short Communications'' sections of *JAVMA* and *Veterinary Record*, respectively, as these articles generally did not meet the criteria for evidence-based practice. The remaining articles were then classified by format, using the categories defined by Haynes et al.: original study, review, general article, conference report, decision analysis, and case report [12]. Because a large number of research studies in veterinary medicine used a relatively small number of subjects, the author revised Haynes et al.'s criteria for a case report, redefining it as an article of a descriptive nature, pertaining to a particular event and involving fewer than ten subjects. A standard form was used to record the classification data.

The purpose of the articles classified as original studies were then identified. Categories for purpose included etiology, prognosis, diagnosis, treatment or prevention, or other. Recognizing that an article could have more than one purpose, each article was classified for all applicable purposes. The methodologic rigor of articles identified as original studies was established by purpose category. Articles had to meet one methodologic criteria listed by Haynes et al. as an appropriate research method for the identified purpose category. Haynes et al. set minimal standards to evaluate the methodologic rigor of articles included in their study, noting few studies actually meet the full criteria for methodologic soundness, and ''clinicians are likely to be better informed looking at the best available literature even if it falls short of perfection'' [13].

Search terms and phrases identified by Haynes et al. as most effective for identifying clinically sound articles related to etiology, prognosis, diagnosis, and treatment and prevention were modified for the CAB Abstracts database (Appendix). Search #1 consisted of the best single term to locate articles for the individual purpose categories [14, 15]. Search #2 consisted of terms Haynes et al. indicated would return the highest sensitivity, defined as the proportion of relevant citations found divided by the number of relevant citations in existence. Search #3 consisted of terms Haynes et al. indicated would return the greatest specificity, defined as the proportion of relevant citations found divided by the total number of items found. Terms and phrases specifically used in the publication type and subject heading fields of the MEDLINE database, such as clinical trial (pt) or randomized controlled trial, were modified for keyword searching on CAB Abstracts. Terms listed under exploded Medical Subject Headings (MeSH) were listed as keywords for the CAB Abstracts search.

The CAB Abstracts database was then searched on SilverPlatter's WebSPIRS interface using the modified search strategies. Results were limited to the two manually reviewed journals, the journal article type of publication, and the publication year 2000. Sensitivity and specificity for each search was then calculated.

RESULTS

The author manually reviewed 390 articles published in the year 2000 volumes of *JAVMA* and *Veterinary Record* (Table 1). Of these articles, 289 met the criteria for an original study. As in the Haynes et al. study, fewer than 50% of the articles in two purpose categories, diagnosis and treatment or prevention, met the generous criteria established to evaluate methodological soundness (Table 2). A large number of original articles (n = 160) were classified under the other category. This number included articles pertaining to anatomy, pathology, food safety, animal production, animal wel-

Table 1
Format categories of classified articles

Format category	Number of articles
Original study	289
Review	0
General article	12
Conference report	0
Decision analysis	0
Case study	89
Total	390

Table 2
Original studies, classified for purpose

Purpose category	Number of articles (% meeting methodologic criteria)
Etiology	32 (71.9)
Prognosis	17 (82.3)
Diagnosis	28 (39.3)
Treatment or prevention	92 (30.4)
Other	160

fare, epidemiology, and numerous other areas of veterinary medicine that were not specifically related to the etiology, diagnosis, prognosis, and treatment or prevention of a specific disease or condition.

Of the articles reviewed in *Veterinary Record*, none were identified for the prognosis purpose category. The lack of sensitivity and specificity reported for prognosis searches #1, #2, and #3 reflected this (Tables 3 and 4). It is important to note, however, that the methodological search filters for prognosis search #1 returned seven hits, search #2 returned fifty-two hits, and search #3 returned four hits. None of the hits were relevant.

The sensitivities and specificities of the modified search strategies run on CAB Abstracts were markedly different when results were broken down by journal title. Etiology search #1 resulted in an overall sensitivity of 65.5% and a specificity of 36.8%. When limited to *JAVMA*, the sensitivity of the search was 82.6% and the specificity 46.3%. The same search limited to *Veterinary Record* resulted in a sensitivity of 22.2% and a specificity of 12.5%. Etiology search #3, which contained terms Haynes et al. identified for high specificity, returned results with a specificity of 75% in *JAVMA* and 0 in *Veterinary Record*, respectively. The small number of relevant citations identified for *Veterinary Record* items in CAB Abstracts seriously affected the overall sensitivity and specificity of *JAVMA* and *Veterinary Record* searches combined.

The largest number of articles (n = 92) were classified under the treatment or prevention purpose category. The search strategies for treatment or prevention resulted in sensitivities and specificities of less than or close to 50% for *JAVMA* and *Veterinary Record* combined. The exceptions were search strategies #1 and #3, whose specificity was 100% and 85.7%, respectively. These percentages are misleading. Search #1 returned five of the ninety-two relevant treatment or prevention articles for publication year 2000, resulting in a low sensitivity of 5.4%. All of these five hits were relevant, however, resulting in a specificity of 100% for the modified search strategy. Search #3 had similar results.

Overall, the sensitivity and specificity of the search strategies were disappointing. While the sensitivity for etiology and diagnosis searches #1 and #2 was comparable to the sensitivities detected by Haynes et al., at 65.5% and 85.7%, respectively, sensitivity for the searches on prognosis and treatment or prevention was less than or nearly equal to 50% [16]. Search #1 for prognosis returned a dismal sensitivity of 11.8%. Specificity for all searches, except treatment or prevention searches #1 and #3, was less than 40%.

DISCUSSION

The methodological search strategies developed by Haynes et al. for MEDLINE are not effective in locating veterinary medical literature for evidence-based practice in the CAB Abstracts database [17]. It would be useful to conduct the same study on the MEDLINE database to determine whether the strategies are effective in locating veterinary medical literature for evidence-based practice in MEDLINE. As noted by Keene, research required for evidence-based practice may not

Table 3
Sensitivity* of modified search strategies† applied to the *Journal of the American Veterinary Medical Association* (*JAVMA*) and *Veterinary Record*

Purpose	*JAVMA*	*Veterinary Record*	*JAVMA* and *Veterinary Record*
Etiology			
Search #1	82.6%	22.2%	65.5%
Search #2	73.9%	44.4%	65.6%
Search #3	13.0%	—	9.7%
Prognosis			
Search #1	11.8%	—	11.8%
Search #2	82.3%	—	58.3%
Search #3	47.0%	—	38.1%
Diagnosis			
Search #1	88.2%	81.8%	85.7%
Search #2	88.2%	81.8%	85.7%
Search #3	17.6%	9.1%	14.3%
Treatment or prevention			
Search #1	5.1%	6.1%	5.4%
Search #2	64.4%	39.4%	55.4%
Search #3	5.1%	9.1%	6.5%

* Sensitivity is defined as the number of relevant citations found divided by the number of relevant citations in existence.
† The modified search strategies for CAB Abstracts are listed in the appendix.

Table 4
Specificity* of modified evidence-based medicine search strategies or filters applied to *JAVMA* and *Veterinary Record*

Purpose	*JAVMA*	*Veterinary Record*	*JAVMA* and *Veterinary Record*
Etiology			
Search #1	46.3%	12.5%	36.8%
Search #2	39.8%	18.1%	31.3%
Search #3	75.0%	—	42.8%
Prognosis			
Search #1	40.0%	—	16.7%
Search #2	29.2%	—	14.0%
Search #3	36.4%	—	30.8%
Diagnosis			
Search #1	13.9%	9.7%	11.9%
Search #2	13.5%	9.5%	11.6%
Search #3	75.0%	12.5%	33.3%
Treatment or prevention			
Search #1	100.0%	100.0%	100.0%
Search #2	48.7%	26.0%	39.8%
Search #3	100.0%	75.0%	85.7%

* Specificity is defined as the number of relevant citations found divided by the total number of citations found.

yet be available in significant quantities for veterinary practitioners [18].

Regardless, all indexes are unique, formulating their own policies for including articles and assigning indexing terms to support their missions. CAB Abstracts includes the equivalent print content of *Index Veterinarius, Veterinary Bulletin, Animal Breeding Abstracts, Helminthological Abstracts, Protozoolocial Abstracts, Nutrition Abstracts and Reviews Series B: Livestock*, and *Review of Medical and Veterinary Entomology*. The service comprehensively scans relevant literature and aims to comprehensively record ''the most relevant and scientifically significant material'' [19]. Thus, articles in the ''Veterinary Medicine Today'' section of *JAVMA* are not indexed comprehensively. Prior to the study, however, the author decided to exclude articles from this section of the journal, as most were not applicable to evidence-based practice. The author found eleven entries in the CAB Abstracts database that were coded as journal articles but should have been classified as the correspondence type of publication. These eleven *Veterinary Record* entries were excluded from the study.

Haynes et al.'s search strategies included terms from MEDLINE's highly structured subject vocabulary [20]. Many of these MeSH terms did not translate precisely to index terms found in the CAB Thesaurus, therefore, the author opted to search the terms as keywords, using the ''words anywhere'' feature for CAB Abstracts on the WebSPIRS interface [21]. This strategy might have failed to locate sufficient numbers of articles for evidence-based medicine, as it assumed the specific words listed in the strategy were present in the title, abstract, or subject-related fields. If the author did not include these words in the title, or the words were not present in the abstract or subject-related fields, then the searches would fail to locate relevant articles.

A review of PubMed's Frequently Asked Questions site reveals forty-eight publication types, including clinical trial, randomized controlled trial, meta-analysis, and review. Haynes et al.'s research strategies include the methodology-related publication types. CAB Abstracts assigns sixteen publication types, none of which are useful for limiting articles for evidence-based practice by methodology. The clinical trial, randomized controlled trial, meta-analysis, and review publication types available in MEDLINE would be useful for pinpointing research for evidence-based veterinary practice in CAB Abstracts. Consistent use of subject headings related to these research methodologies would also be helpful.

A study specifically examining useful methodologic search strategies for identifying research for evidence-based veterinary practice in the CAB Abstracts database is necessary. Such research should consider peculiarities unique to veterinary research itself, including the structure and indexing policies of the CAB Abstracts database, and should consist of a larger sample of veterinary journals.

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APPENDIX

Modification of search terms and phrases

These search strategies were designed to search CAB Abstracts on the WebSPIRS interface.

Purpose category	MEDLINE search strategy	CAB Abstracts modified search strategy
Treatment or prevention		
Search #1	Clinical trial (pt)	Clinical trial
Search #2	Randomized controlled trial (pt) or Drug therapy (sh) or Therapeutic use (sh) or Random: (tw)	(random* and control* and trial) or (drug and therapy) or (therapeutic and use) or random*
Search #3	Placebo (tw) or Double (tw) and Blind: (tw)	placebo or (double and blind*)
Prognosis		
Search #1	Exp cohort studies	(cohort and stud*) or (longitudinal and stud*) or (follow-up and stud*) or (prospective and stud*)
Search #2	Incidence or Exp mortality or Follow-up studies or Mortality (sh) or Prognos: (tw) or Predict: (tw) or Course (tw)	incidence or (mortality) or (cause and death) or (fatal and outcome) or (hospital and mortality) or (infant and mortality) or (maternal and mortality) or (survival and rate) or prognos* or predict* or course
Search #3	Prognosis or Survival Analysis	prognosis or (survival and analysis)
Etiology		
Search #1	Risk (tw)	Risk
Search #2	Exp cohort studies or Exp risk or Odds and ratio: (tw) or Relative and risk (tw) or Case and control: (tw)	((cohort and stud*) or (longitudinal and stud*) or (follow-up and stud*) or (prospective and stud*)) or ((risk or (logistic and model*) or (risk and assessment) or (risk and factor*) or (odds and ratio*) or (relative and risk) or (case and control*))
Search #3	Cohort Studies or Case-control Studies	(case and control* and stud*) or (cohort and stud*)
Diagnosis		
Search #1	Diagnosis& (pe)	Diagnosis
Search #2	Exp sensitivity a#d specificity or Diagnosis& (pe) or Diagnostic use or Sensitivity (tw) or Specificity (tw)	(sensitivity or specificity) or (predictive and value and test*) or (ROC and curve) or diagnosis or (diagnostic and use)
Search #3	Exp sensitivity a#d Specificity or Predictive (tw) and Value: (tw)	(sensitivity or specificity) or (predictive and value*) or (ROC and curve)